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ABSTRACT

This study, a follow-up to an earlier study (reported in the 1998 "Mid-Western Educational Researcher" v10 n4) used the World Wide Web and a "Class Page" to evaluate interaction strategies in a distance education setting. This study further examines Lev Vygotsky's social learning theories as they apply to the asynchronous learning environment available over the Web. Fifty-four graduate-student participants, mostly elementary school teachers, completed survey instruments concerning their participation in the "Class Page," interactions with the instructor and other students, and the use of linked resources. An initial survey regarding computer literacy skills and usage proficiencies was followed by eight additional surveys that focused on "Page" use and interaction patterns. Data analyses indicate responses that were in contrast with those of the additional study. The use of the "Class Page" enhanced interaction and contributed to the successful learning results from this distance education classroom. (Contains 21 references.) (Author/SLD)

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Abstract

This study, a follow-up to an earlier study (reported in the 1998 Mid-Western Educational Researcher, Vol. 10, no. 4), utilized the World Wide Web and a "Class Page" to evaluate interaction strategies in a distance education setting. This study further examines Lev Vygotsky's social learning theories as they apply to the asynchronous learning environment available over the Web. Participants were primarily elementary school teachers (n= 54 graduate students) who completed survey instruments concerning their participation on the "Class Page," interactions with both the instructor and other students, as well as the utilization of linked resources. An initial survey regarding computer literacy skills and usage proficiencies was followed by eight additional surveys which focused upon "Page" use and interaction patterns. Data analyses indicate contrasting responses compared to the initial study.

Distance Interaction Through the World Wide Web in Graduate Teacher Education: A Follow-up Analysis of Student Perceptions

Introduction

Communication between teacher and student is the essence of teaching and learning. Students often assume a passive role in this social communication process as the recipient of information actively delivered by the instructor. This traditional educational model --- teacher as the provider of information and student as the recipient of information --- has served for many years as a means of educating students. A recent report, issued by public university presidents belonging to the Kellogg Commission on the Future of State and Land-Grant Universities, stated that higher education must invest in technologies which "prepare students to continue their education by using collaborative, interactive teaching methods to teach critical thinking skills" (Chronicle of Higher Education Online, September 16, 1999).

Technology advances have made it possible to have effective collaborative exchanges between teacher and student, as well as between student and student, outside the formal classroom setting. World Wide Web (Web) based technologies have created educational opportunities that simulate traditional social learning experiences similar to those reported in Lev Vygotsky's research on social learning. The focus of this follow-up study examines the use

of the World Wide Web and an asynchronous "Class Page" to evaluate interaction strategies in a distance education setting (see earlier studies in 1998 Mid-Western Educational Researcher, Vol. 10, no. 4).

The impact of Web based technologies and the potential impact these can have upon teaching and learning is a ripe area for research. The following questions are posed: What is the research base regarding learning effectiveness and student experiences utilizing Web based technologies? What strategies have been designed to assist technophobic faculty in developing the requisite skills to develop learner focused Web pages? What technical support is needed to develop dynamic interactive uses of the Web? Is the educational promise of the Internet as real as it seems? Will such technology stimulate faculty and students to teach and learn in different ways? Can learning communities be developed and sustained utilizing this technology?

Brief Literature Review

Educational theorists have long claimed that effective learning is enhanced by the active involvement of the learner (see: Rotter, 1954; Rogers, 1969; Astin, 1984; Holmberg,1989; and Johnson & Johnson, 1994). If learning requires interaction among learners, then modern educators need to develop tools and assessment strategies which encourage interaction in the educational setting. Successful interactions using collaborative discussion type tools is greatly dependent upon how well the tools are implemented and integrated into the design of the curriculum. Since these tools serve as a mediating means to

exchange ideas between learners and their environments, simply automating existing educational process may not lead to improved learning (Tudge and Hogan, 1997, p. 4). Collaborative tools represent the greatest flexibility for design interpretation in the educational setting. They also represent the greatest challenge to teachers to make effective use of such technologies. (Pea, 1997, p. 285).

Much of the literature relating to the collaborative learning theories of Lev Vygotsky revolve around the effects of social interactions of learners. To Vygotsky learning was something that developed through interactions with others. As learners collaborate through the exchange of views, they begin to develop and support a greater understanding (Vygotsky, 1978). The social learning theories of Vygotsky apply to the collaborative asynchronous learning environment that is possible using the Web. Vygotsky proposed that every function in the child's environment needs to appear twice: first, on the social level (interpersonal, between individuals), and second, on the individual level (intrapersonal, reflective within the individual) (Vygotsky, 1978, p. 57).

This study extended Vygotsky's theories to social interactions of peer adult learners, and also extended his theories to include the asynchronous Web based collaborative tools that are available today. The educational benefits of Vygotsky's social learning theories are equally applicable to the social interactions of adults as they are with children (Tudge, 1990, p. 159).

Purpose and Methodology

It is critical to plan for interactivity in a distance education setting in which one-way video with two-way audio is utilized as the delivery system, as was the case in this study. The specific focus of this study was a distance education classroom which utilized the World Wide Web and a "Class Page" designed and developed for a specific graduate level course in Curriculum.

The purpose of this follow-up study was to collect data regarding the impact of utilizing an asynchronous "Class Page." The specific purposes were:

(1) to monitor and assess interaction between the instructor and students;

(2) to enhance interaction between students and peers at different site locations and at different times;

(3) to facilitate student utilization of Web resources provided through the "Class Page;"

(4) to compare these data with earlier data (see 1998 Mid-Western Educational Researcher, Vol. 10, no. 4) to investigate the changes that occurred in elementary teacher applications and perceptions of Web based instructional technology; and

(5) to examine the application of Vygotsky's social learning theory in the context of understanding and applying classroom technology.

An initial survey regarding students' computer literacy skills and usage proficiencies was followed by eight additional surveys which focused upon

"Page" use and interaction patterns. Data were collected through the use of survey instruments developed to determine participants' perceptions and actions regarding the "Class Page." Interactions with both the instructor and other students who were enrolled in the class were also investigated. An electronic Web compatible survey software, "**inQsit**," developed by the University Computing Services at Ball State University, was utilized to collect data through the "Class Page" itself. This resource allowed for a wide array of survey and questionnaire options: instruments using Likert type scales, semantic differential formats, single word responses, short answer responses, and essay responses. These data were compared and contrasted to earlier data that were collected and reported. The resulting information enabled the researchers to develop hypotheses regarding changing skills and perceptions of elementary classroom teachers regarding their knowledge and application of Web-based instructional technologies.

The participants were primarily elementary school teachers (47 graduate students in 1997 and 54 graduate students in 1999) who were enrolled in a television course entitled "Elementary School Curriculum" (EdCur 610) during the Spring Semesters of 1997 and 1999. The 1999 data were compared to earlier 1997 data to assess pattern changes and perceptions about the use of instructional technology. A series of time dated surveys (total of eight) were administered during the semester. Data collected from these surveys were compiled and reported in raw numbers and percentages rounded to the nearest

whole number. Means and standard deviations were reported in the data analyses, and the resulting frequency and interaction patterns were used in analyzing and interpreting the responses and activities attributed to the "Class Page."

Why use this type of instructional technology?

As consumers of television most adults have learned to respond passively to this medium, i.e. we view and do not expect to be engaged in dialogue with either the presenter or the topic. To combat this learned behavior, the "Page" was designed to promote active student involvement in the learning process prior to attending class and during the live broadcast itself. The "Class Page" reinforced the student's ability to manipulate the technology effectively as a tool in a Web environment. Vygotsky proposed that tools mediate learning. The "Class Page," a tool in this case, was used as a conductor to convey human influence (Vygotsky, 1978, p. 55). An immediate difficulty, however, arises. For students to be effective in utilizing the "Class Page," they must be confident in their skills to use the "Class Page" area as a tool to convey thoughts and ideas.

A specific goal of the "Class Page" was to establish a forum for students to express their opinions, to exchange ideas, to share experiences, and to describe successful classroom ideas and practices. The collaborative nature of the "Class Page" allowed the learner to express opinions and to share ideas through a student forum. Whereas the previous paragraph focused on the student's ability to use technology effectively as a mediating means to convey

ideas, the focus here is on the students' ability to express their ideas effectively as well as to comprehend the ideas of others. From a Vygotskian perspective, students express opinions, build ideas, and inversely foster comprehension and cognitive development through their collaborative efforts. This was accomplished through the creation of user friendly pages that enabled students to post ideas directly on the Web by typing comments, messages and information in a brief form, then posting that information to the "Class Page" by clicking the "post" button.

The design of the user friendly page supported interactivity. This feature increased critical thinking. Students "posted" information to the "Class Page" where others could read and respond to this information. Multiple areas within the "Class Page" utilized this process:

(1) "Motivational Ideas" was the title of a page where students posted creative ideas that were judged to be valuable learning activities for elementary students, i.e. classroom successes.

(2) "Projects" was the title of a page where students posted project work and as a result peers could develop knowledge, provide assistance to others, and share personal experiences while the individual or group worked on this activity.

(3) "Discussion Area" was the title of a page, a modified newsgroup format, that allowed students to discuss class topics and respond to the views of their classmates prior to the class meeting when the topic was discussed.

Students also posted questions or follow-up discussion items following the class.

(4) "Web Reviews" was the title of a page where students analyzed, reviewed and evaluated a Web site.

(5) "Handouts" was the title of the page where students working in small groups posted Internet sites related to the class discussion topic to assist colleagues with diverse resources to aid in class preparation. To facilitate this aspect of the course, a workshop was provided at the beginning of the class to teach Web search skills.

Each of the "Class Page" public areas previously described was put on the Web for consumption by everyone in the class including the instructor and graduate assistants.

This "Class Page" was based on the idea that students are encouraged or inspired to learn when they are engaged in activities of interest (Hartman, 1998, 95). Vygotsky believed that interpersonal process, such as collaborative "Discussion" area topics and ideas, were transformed into internal processes as the result of a series of developmental events. These developmental events were the introduction of ideas that were challenged and reinforced by opposing ideas and finally internalized as a learned topic (Vygotsky, 1978, p. 57). "Class Page" discourse was a meaningful activity socially because it created a situation in which students were encouraged to share ideas, challenge opposing ideas, and translate discourse into learning experiences.

A private forum was needed for student exchanges with the instructor, graduate assistants, and class peers as well as with working class groups. A class post office was established with e-mail addresses which linked class members to each other privately. To personalize the post office, a small individual photo icon was added to individual e-mail links. This aspect of the "Class Page" was not monitored by the instructor; however, feedback from many students indicated it was a valuable aspect of the communication process and one that was used extensively in dialogue with peers, the instructor and graduate assistants. The instructor typically received e-mail from approximately one half of the class members weekly in 1999. This compared to over two-thirds of the 1997 students sending weekly e-mail messages to the instructor. During both classes all distant site students communicated with the instructor through this process. The decreased e-mail sent to the instructor in 1999 was due to fewer problems existing with the technology itself. Increased student confidence and experience in using the technology had occurred during the intervening time since the 1997 class.

The instructor prepared a "Class Questions" page as a way of stimulating student thought about specific topics prior to class. This also encouraged and assisted the students in their class preparation. Students were encouraged to dialogue with other students in the "Discussion Area" regarding their experiences and thoughts on the topic before the class meeting. The "questions" were

designed to enhance class preparation and to make time spent in class more interesting and valuable.

In summary, the "Class Page" was designed and created to accomplish the following goals:

- to increase classroom interaction
- to provide instructional resources
- to establish a communication forum
- to supplement class preparation
- to create a user friendly site, and
- to model classroom use of instructional technology

Data Relative to the Utilization of the "Class Page"

At the beginning of the semester students were surveyed regarding their computer literacy skills and usage patterns. These data were critical to the success of the project since computer skills were essential to the effective use of Web based technologies. In 1997, 70% of the population reported they had a personal computer in their home, in 1999 this had increased to 83% of those enrolled; 92% in 1997 compared to 85% in 1999 had a computer available at work. In both studies computers were used primarily in word processing tasks. In 1997, only 57% of the available computers had Internet access; this had increased to 89% in 1999. In 1997, 54% of the students had previously used electronic mail; this percentage had increased to 91% in 1999. Eight percent (8%) of the students enrolled in the 1997 class used the Internet on a regular

basis; in 1999 this figure increased to 39%. Only one in three students (32%) in 1997 had used the Internet more than once prior to this class; 95% of the students reported extensive use of the Internet prior to enrolling in the 1999 class. Fifty-seven per cent (57%) in 1997 reported they had never performed any function on the Internet; no one reported this in 1999. Only 5% in 1997 compared to 17% in 1999 of the population described themselves as being "very skilled" in using this resource. When asked if computer training would be helpful, 72% of the 1997 group and 74% of the 1999 respondents responded in the affirmative; and 86% in 1997 compared to 89% in 1999 requested help in using the Internet.

The above data, combined with additional data not reported here, confirmed that a shift in understanding and skill levels has occurred in the classroom teachers enrolled in graduate school. What was perceived as a challenge in 1997 to provide valuable experiences and skills to a group of professional educators and thereby enhance their classroom effectiveness had changed by 1999. Numerous intervening variables had changed the skill levels, experiences, and teacher perceptions toward to the Internet specifically and toward computers generally. However in spite of increased Internet use, the perceived need to learn additional skills remained very high for these teachers.

Surveys were administered following the first two weeks of class in 1997. This same pattern was followed in 1999. Using a five point scale from "strongly disagree" to "strongly agree," 85% of the students in 1997 and 74% of the 1999

respondents, agreed or strongly agreed they would learn new computer skills using the "Class Page." Almost four of every five students (79%) in 1997, and almost nine of ten students (89%) in 1999 indicated they enjoyed exploring the resources available on the "Class Page." Seventy-one per cent (71%) in 1997, compared to only 12% in 1999, strongly agreed that exploring the Internet was an enjoyable new experience.

The initial responses, based upon the students' comfort levels using technology, were favorable. This was attributed in part to the simplicity of Web based learning and to the effectiveness of the design and implementation of the "Class Page" into the daily activities of students. The "Class Page" served as the technical tool to mediate ideas between students. The responses support Vygotsky's theory that the tool's function is to serve as the conductor of human influence (Moll, 1990). If one looks at the "Class Page" area strictly as a functioning tool, then the assumption is that the students were comfortable in conveying their ideas using technology.

As the semester progressed, more students engaged in utilizing the "Class Page" as a learning resource. At six weeks, 58% of the students in 1997 indicated they were secure in their use of the "Page" compared to 96% of those reporting in 1999. The 1999 group gave numerous examples that indicated their comfort zone with the Internet enabled them to work beyond the tasks completed by the 1997 class. In 1997, 62% acknowledged this technology encouraged out-of-class participation; in 1999 this had increased to 83% of the population. Two

of three students (66%) in 1997 reported they enjoyed using the "Page" to explore the Internet compared to 84% of the 1999 class. Half of the students in 1997 reported they found additional class resources through the Web sites posted on the "Page;" this number had increased to 96% in the 1999 data responses. An important difference was found in the use of e-mail. In 1997, 77% reported they were using e-mail to correspond with fellow students; this dropped to less than one in three (32%) for the 1999 group. A possible explanation is that the comfort level of the 1999 respondents with their skills did not require the same amount of sharing and discussion via e-mail. The instructor logged considerably fewer "help" messages in 1999 and noted a stronger focus upon class issues in the e-mail received.

Approximately half way through the class the feedback on the utilization of the "Page" became increasingly positive. Three of every five students (60%) in 1997, and 69% of the 1999 respondents, reported the distance learning setting encouraged class involvement. Over three of four students (76%) in 1997, and 87% in 1999, indicated the "Discussion Area" on the "Page" encouraged the examination of important topics. In 1997, 83% of the respondents stated they were gaining important computer competencies; this figure dropped to 49% in the 1999 data. In 1997, 86% reported the "Page" was user friendly, this increased in 1999 to 98%.

Other aspects of the "Page" were designed to encourage interactivity. Respondents reported:

- course "handouts" were very good or excellent (72% in 1997 compared to 94% in 1999);
- "class questions" were stimulating for thought and discussion (78% in 1997 compared to 97% in 1999);
- the notice board kept them informed (84% for both groups);
- the linked Web sites provided valuable educational resources (81% in 1997 and 100% in 1999); and
- the usefulness of the "Page" was judged as valuable (80% in the 1997 population compared to 96% in the 1999 class).

More than four of every five students (83%) in 1997 gave examples of actions they had taken to make the "Page" valuable to them in out-of-class activities; one hundred per cent (100%) of the 1999 respondents provided such examples.

A survey administered during the last month of the semester found that 66% of the students in 1997 were regularly using the "Page" to interact with classmates; this increased to 85% in 1999. Only 6% in 1997, and 2% in 1999, reported "strongly agreement" with the statement "I am frustrated when using the 'Class Page'." In 1999, 98% reported they were secure or very secure in using this resource in the learning environment.

The final class survey, a required Faculty/Course Assessment Form, was administered during the 15th week of the semester. Several questions were repeated to determine if changes had occurred in student perceptions regarding the "Class Page" and the way it was used. The respondents (62% in 1997

compared to 98% in 1999) reported that interactions on the "Page" stimulated critical thinking. Eighty-five per cent (85%) in 1997 compared to 96% in 1999 deemed the resources on the "Class Page" to be relevant to course objectives and their learning; and 77% in 1997 compared to 93% in 1999 judged the "Page" helped to achieve course purposes. When judging the expectations of students using the "Page," 82% in 1997 reported this was appropriate to their current level of development compared to 91% in 1999. Over nine of every ten students (91%) in 1997, compared to 98% in 1999, indicated they felt free to express "ideas, judgments, and questions."

The fundamental purpose behind the development of this technology was to increase interaction. Eighty-eight per cent (88%) of the students in both studies reported interactions with other students as very helpful in mastering course concepts and competencies. One hundred per cent (100%) in 1997 indicated peer interaction was very helpful; this figure dropped in 1999 to 93% of the respondents. One additional item asked if "Page" participation encouraged the student to apply concepts and competencies beyond the context of the distance education classroom; 86% in 1997 and 91% in 1999 reported this was indeed the case. Analysis of written responses to open ended questions for both groups revealed that only one respondent from the 1997 class failed to give examples regarding the value of using the "Page" during the semester.

Summary

In the distance education environment it is critical for the instructor to focus upon pre-planned interaction strategy components to enhance involvement and learning. The "Class Page" was based upon the idea that learning is the product of an exchange of ideas between individuals. In particular, this project used Web based technologies as the mediation means of exchange. In traditional classroom teaching methodologies, students have been passive recipients of information. Today, advances in technology allow students the immediate leverage of collaborative technologies to become active participants in social learning processes. The "Class Page" served as a social meeting place for asynchronous collaborative interactions between individuals. The absence of such planned learner engagement will potentially result in the one way delivery of instructor lecture information with little student interaction with the instructor or with other students. One of the persistent criticisms of distance education has been that the instructional approach used too often has involved what has been called the "talking head" syndrome, i.e. information is provided with very little exchange or engagement between students and instructor. An alternative to address this concern must consider ways to increase learner efficacy through greater student involvement (Bates, 1995; Sayers, 1996).

These studies involved the use of current Web technologies combined with the creation of a user friendly set of tools to make the distance education classroom more interactive. Both courses, 1997 and 1999, were designed and

delivered with the goal of enhancing interaction through the utilization of a "Class Page" accessed on the World Wide Web. This "Page" was developed to promote numerous opportunities for students to become actively involved in both course content and interaction with the instructor and class peers. Given these were graduate level courses, it was not surprising that students had little difficulty expressing their ideas and opinions in a collaborative forum. It is essential, however, to remember that Vygotsky contended that effective collaboration occurs between individuals, as in this case through the "Class Page", as all higher cognitive functions originate from relations between individuals (Vygotsky,1978, p. 57).

The learning theories of Lev Vygotsky serve as the basis for explaining the observed learning benefits derived from collaborative exchanges between individuals. In particular, Vygotsky's zone of proximal development stated that the learner has the greatest potential for learning when operating within the zone. The zone of proximal development is unique to each individual and is dynamically established when two or more individuals gather to exchange ideas (Moll, 1990). The "Class Page" is unique when compared to traditional methods of learning in that the use of technology can actually increase the probability that student interactions will occur. Without the normal constraints of time and locality in the traditional classroom environment, students can dynamically establish a zone of proximal development anytime of the day by simply connecting to the "Class Page" and asynchronously collaborating with others.

Data were collected during the spring semesters of 1997 and 1999 to develop understandings regarding the impact and use of the "Page" upon both involvement and interaction of the students in different classes. The change in skill level over time on the part of classroom teachers was also investigated. The evidence collected regarding student behavioral changes relative to interaction in these studies was dramatic. For example, frustration levels decreased, and the sense of security using this resource increased. Increases were also noted regarding the views of respondents relative to this resource increasing critical thinking and learning. The impact of the "Page" upon both interaction and learning was substantiated. Numerous changes were noted as to the skill levels and student perceptions based upon comparative analyses of the responses to these studies. For example, data collected from this study point to more classroom teacher familiarity with computer usage, with the Internet, and with instructional applications of technology in the class setting. Multiple items were used for illustrative purposes to compare the two groups. Increases were noted across the semesters in questions about out of class participation, enjoyment using the Internet, and perceptions regarding the distance environment tools encouraging involvement and interaction

The electronic monitoring of student use of the "Page" found continued increase in use patterns across classes, and consistent use in both classes through the end of the semester. Following completion of the class in 1997, over half of the enrolled students requested permission to continue using the

resources on the "Page;" this indeed was gratifying. An "Alumni Discussion Area" was added to address an expressed student need to continue the dialogue they had initiated. The only aspect of the "Page" which was not made available following the end of semester was the e-mail post office as this area was reestablished for subsequent students entering the class the following semesters.

The "Class Page" was developed and used to create a valuable connecting bridge that linked instruction with technology. The utilization of this resource greatly enhanced interaction and contributed to the successful learning results which emerged from this distance education classroom. The goal to enhance distance education classroom interaction utilizing the Web was realized. This learning experience produced a positive impact not only in these distance education classrooms, but also in the broader context of understanding technological tools and the opportunities that effective classroom tested tools can provide in assisting instructional delivery and learning.

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